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DEVELOPMENT OF BANTEN CULTURE-BASED ANIMATED VIDEO LEARNING MEDIA TO ENHANCE MATHEMATICAL CONCEPT UNDERSTANDING

Aulia Urohmah[1], Yuyu Yuhana[2], Novaliyosi[3]

[1,2,3] Universitas Sultan Ageng Tirtayasa, Kota Serang, Indonesia
** Corresponding author. Jl. Ciwaru Raya – Cipare. 42117, Kota Serang, Indonesia*

E-mail: auliaurohmah089@gmail.com [1]
yuhana@untirta.ac.id [2]
novaliyosi@untirta.ac.id [3]

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ABSTRACT
This investigation focuses on developing animation-based educational media incorporating Banten cultural elements to enhance students' mathematical conceptual understanding of polyhedrons. The study implemented Research and Development (R&D) methodology through the 4D development framework (define, design, develop, disseminate) with ninth-grade students at SMP Negeri 10 Serang City as research subjects. The comprehensive development process encompassed in-depth needs assessment, systematic media planning, creation of animated videos harmonizing Banten cultural components with geometric polyhedron concepts, rigorous expert evaluation, and controlled distribution. Research findings indicate that the developed educational media achieved an overall validation score of 80.5% (highly valid category), with specific ratings of 86% from content specialists and 75% from media experts. Practicality assessment through student feedback questionnaires yielded an 82% result (highly practical category). The media's effectiveness was confirmed through substantial improvement in students' mathematical conceptual comprehension abilities, with average scores increasing from 30.16 in the pretest to 84.92 in the posttest, achieving an N-Gain indicator of 0.77 (high category). Based on these comprehensive evaluations, it can be concluded that the animation video learning media grounded in Banten cultural elements proved to be highly valid, exceptionally practical, and effective in enhancing students' mathematical conceptual understanding of polyhedrons.
Keywords: animation video learning media; Banten culture; mathematical concept understanding

ABSTRAK
Studi ini difokuskan pada pengembangan media edukatif berupa video animasi dengan muatan kebudayaan Banten untuk meningkatkan kapasitas siswa dalam memahami konsep matematis terkait bangun ruang sisi datar. Pendekatan Research and Development (R&D) diimplementasikan melalui model pengembangan 4D (define, design, develop, dan disseminate) dengan subjek penelitian siswa kelas IX SMP Negeri 10 Kota Serang. Rangkaian proses pengembangan mencakup analisis kebutuhan mendalam, perancangan media yang sistematis, kreasi video animasi yang mengharmonisasikan elemen kebudayaan Banten dengan konsep geometris bangun ruang sisi datar, evaluasi ketat oleh para ahli, serta distribusi terbatas. Temuan penelitian mengindikasikan bahwa media pembelajaran yang dihasilkan memperoleh nilai validasi total 80,5% (termasuk kategori sangat valid), dengan rincian penilaian dari ahli materi sebesar 86% dan ahli media sebesar 75%. Pengujian kepraktisan melalui kuesioner respon siswa menunjukkan hasil 82% (kategori sangat praktis). Keefektifan media terverifikasi melalui peningkatan substansial pada kapabilitas pemahaman konsep matematis peserta didik, dari skor rata-rata pretest 30,16 menjadi 84,92 pada posttest, dengan indikator N-Gain mencapai 0,77 (kategori tinggi). Berdasarkan serangkaian evaluasi tersebut, dapat disimpulkan bahwa media pembelajaran video animasi dengan basis kebudayaan Banten terbukti sangat valid, sangat praktis,

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dan efektif dalam meningkatkan pemahaman konsep matematis siswa pada materi bangun ruang sisi datar.
***Kata kunci**: bangun ruang sisi datar; kebudayaan Banten; media pembelajaran video animasi; pemahaman konsep matematis.*

Introduction

Technological developments have significantly transformed the educational landscape in recent years, creating new paradigms in the teaching and learning process (Hasnida et al., 2023). The integration of technology in education has been proven to improve access to learning resources, facilitate personalized learning experiences, and promote higher student engagement. One effective form of technology is animated video, which not only attracts students' interest but is also capable of visualizing abstract concepts more concretely, especially in mathematics learning that is often considered difficult (Nurmaharani et al., 2023). This medium allows students to understand material deeply through interactive visual and narrative elements, and provides opportunities for both independent and collaborative learning. In addition to enhancing understanding, the use of technology-based media like this has also been proven to increase students' learning motivation, strengthen memory retention, and develop 21st-century skills such as critical thinking, creativity, communication, and collaboration (Scherer & Teo, 2019). Therefore, the utilization of educational technology, particularly through animated videos, is not only an attractive learning alternative but also an important strategy in creating a learning environment that is adaptive to contemporary challenges.

Previous research has demonstrated the effectiveness of animated videos in mathematics learning, as evidenced by Dimyati et al. (2023) who used Doratoon-assisted animated video-based learning media for middle school students with N-Gain results of 0.4162 in the moderate category. This finding indicates an improvement in mathematical concept understanding through interactive and engaging visual media. Hillmayr et al. (2020) emphasized that traditional teaching methods often fail to engage students effectively, thus requiring more innovative and contextual learning approaches to reach all students' learning styles. The use of technology and interactive learning media has been proven effective in increasing students' interest and understanding of mathematics (Sastro et al., 2023), particularly because the visualization of abstract concepts becomes more concrete and easier to understand. Furthermore, research by Sandi et al. (2023) shows that audiovisual media plays a role in strengthening students' information retention, meaning that material delivered through a combination of visual and audio elements is more easily remembered and understood in the long term. Therefore, this research trend underscores the urgency of using animated video-based digital media as a pedagogical strategy capable of addressing mathematics learning challenges in the digital era.

Although previous research has shown the effectiveness of animated videos in mathematics learning, there remains a significant research gap regarding the

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integration of local cultural contexts in learning media. The research by Dimyati et al. (2023) has limitations in terms of insufficient emphasis on integrating local cultural contexts in the developed learning media. The application developed contains elements of local Lampung culture which motivates students to love local culture and preserve local Lampung culture (Sugiharti et al., 2025). The integration of local culture as a context in learning media can increase material relevance and student engagement during the learning process, as students tend to more easily understand abstract concepts when material is connected to experiences and environments they recognize. In this context, local culture such as Banten culture can serve as a bridge between mathematical material and students' daily lives, thus not only improving mathematical concept understanding but also contributing to efforts to preserve regional cultural values.

Based on observations and interviews with mathematics teachers at SMP Negeri 10 Kota Serang on September 23, 2024, several specific problems in mathematics learning were identified. Students stated that mathematics is a difficult subject, especially regarding abstract concepts such as polyhedra that are difficult to relate to real life. The dominant teaching method remains traditional, focusing on lectures and problem-solving exercises without the support of innovative visual media. The minimal utilization of technology-based learning media has become a major factor causing low student participation in the learning process and low student scores in academic evaluations.

To address these problems, this research develops Banten culture-based animated video learning media using the 4D development model (define, design, develop, and disseminate). This model was chosen because it provides a systematic framework for designing and developing effective learning media (Rosed et al., 2023). The designed animated video is not only visually appealing but also tailored to students' needs, learning objectives, and the integration of Banten local cultural contexts. This approach is expected to create more relevant and meaningful learning experiences for students.

Based on the identified problems and research gaps, this research specifically aims to develop Banten culture-based animated video learning media on polyhedra material using the 4D development model. The specific objectives of this research are to test the validity of learning media based on material expert and media expert assessments, analyze the practicality level of media through student responses in learning, and measure media effectiveness in improving students' mathematical concept understanding using pretest-posttest tests. This research also aims to integrate Banten cultural elements such as the Regent's Pendopo Building of Serang City, Banten Grand Mosque, Joeang 45 Building of Serang City, and Avalokitesvara Vihara as contextual and meaningful mathematics learning contexts for students at SMP Negeri 10 Kota Serang.

Research Methods

The population in this study consists of all students at SMP Negeri 10 Kota Serang who became the focus of observation within the predetermined scope and timeframe (Suriani et al., 2023). The researcher employed purposive sampling technique for research sample selection based on specific considerations aligned with the research objectives (Campbell et al., 2020). The selected sample was one

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class of ninth-grade students at SMP Negeri 10 Kota Serang aged 14–15 years, consisting of 36 students. This sample selection was based on student characteristics that predominantly have visual learning styles and possess personal devices to support technology-based learning.

The methodology applied in this study is a Research and Development (R&D) design aimed at creating and evaluating the effectiveness of a learning product (Dimyati et al., 2023). R&D research is longitudinal or staged in nature with the possibility of extending over an extensive time period to ensure optimal product development. The product developed in this research is animated video learning media using the 4D (Four-D Model) development model. The 4D model was chosen because it offers a systematic and structured approach in designing technology and media-based learning with flexibility that allows adaptation to student characteristics (Wahyu, 2022). Model development show in Figure 1.

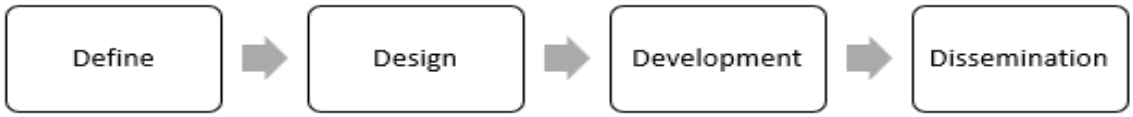

Figure 1. 4D Model development stages

The research procedure was implemented using the 4D model consisting of four main stages: define, design, develop, and disseminate. The define stage includes learning needs analysis, curriculum analysis based on the Merdeka Curriculum, and analysis of ninth-grade student characteristics. The design stage encompasses preparation of tools using Canva Pro and Google Drive, material collection according to Learning Outcomes, creation of media design that integrates Banten culture, and development of research instruments. The develop stage was conducted through animated video product development, validation by material and media experts, product revision, and the disseminate stage through publication on the YouTube platform for wider distribution.

This study uses four types of instruments to measure the investigated variables: interview instruments, feasibility validation, practicality, and effectiveness (Dimyati et al., 2023). Interview instruments were developed for teachers with 8 indicators and students with 8 indicators to obtain an overview of learning conditions at school. Feasibility validation instruments were designed for material experts (15 items) covering aspects of material appropriateness, presentation, and usefulness, as well as media experts (17 items) encompassing media display, design quality, presentation, and usefulness. Practicality instruments use student response questionnaires to assess ease of media use. Meanwhile, effectiveness instruments consist of mathematical concept understanding tests with 7 indicators of polyhedra concept understanding.

Data analysis in this study combines qualitative analysis methods and quantitative descriptive analysis. Qualitative analysis methods were applied to process information obtained from initial interviews to examine learning needs, curriculum structure, and student characteristic profiles, including input and improvement recommendations from material and media expert validators. On the other hand, quantitative descriptive analysis techniques were utilized to measure quality standards of learning media products through validity, practicality, and

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effectiveness parameters. Interpretation of percentage results for validity, practicality, and effectiveness levels was conducted based on categories established in the criteria for each aspect and processed using the following calculation formulas:

Validity

The validity of the developed learning media was evaluated using assessment sheets submitted to experts, both material experts and media experts. The product validity level was determined based on the percentage of evaluation scores collected from both expert groups, as shown in Table 1 below:

Table 1. Product validity level criteria

No.	Percentage Range (%)	Criteria
1.	$0\% \leq x \leq 20\%$	Invalid
2.	$20\% < x \leq 40\%$	Less Valid
3.	$40\% < x \leq 60\%$	Moderately Valid
4.	$60\% < x \leq 80\%$	Valid
5.	$80\% < x \leq 100\%$	Very Valid

Source: Lailia (2021)

To calculate the media feasibility validation value, the following formula was applied:

$$Average\ item\ score = \frac{Validator\ I\ Score\ +\ Validator\ II\ Score}{2}$$

$$Overall\ average = \frac{\sum Average\ item\ score}{Number\ of\ items}$$

Practicality

Media practicality was measured through student response questionnaires after using the media. Practicality assessment criteria refer to Table 2 below:

Table 2. Practicality level criteria

No.	Percentage Range (%)	Criteria
1.	$0\% \leq x \leq 20\%$	Not Practical
2.	$20\% < x \leq 40\%$	Less Practical
3.	$40\% < x \leq 60\%$	Moderately Practical
4.	$60\% < x \leq 80\%$	Practical
5.	$80\% < x \leq 100\%$	Very Practical

Source: Lailia (2021)

To calculate the media practicality value, the following formula was used:

$$Percentage\ = \frac{Raw\ Score}{Maximum\ Ideal\ Score} \times 100\%$$

Effectiveness

Learning media effectiveness was evaluated through concept understanding tests (pretest and posttest). To determine the extent to which media can improve student understanding, analysis was conducted on pretest and posttest scores obtained before and after media use. Effectiveness measurement criteria refer to the

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score range listed in Table 3 below, which provides quantitative guidance in assessing the success of the media:

Table 3. Effectiveness level criteria

No	Percentage (%)	Criteria
1.	<40	Not Effective
2.	40-55	Less Effective
3.	56-75	Moderately Effective
4.	<76	Effective

Source: Lailia (2021)

To calculate the media effectiveness value, the N-Gain formula was used as follows:

$$N - Gain = \frac{S_{posttest} - S_{pretest}}{S_{maximum} - S_{pretest}}$$

Test Instrument Analysis

The developed instruments were tested to determine validity, reliability, item discrimination, and item difficulty level. The trial was conducted on students who had already studied the material. Based on initial trial results, selection was made of evaluation questions used to measure student understanding of polyhedra material. The purpose of this stage is to ensure that each test item meets the criteria as a valid and reliable measuring tool, so that test results can serve as accurate indicators of students' concept understanding achievement.

Results and Discussion

Presentation of Development Results

This research focuses on creating educational materials in animated video format that incorporates local Banten cultural values to deepen students' mathematical understanding regarding three-dimensional geometry with flat surfaces. The methodological framework applied encompasses four sequential stages: define, design, develop, and disseminate, with elaboration as follows:

Define Stage

The define stage constitutes the initial phase in the development series of Banten local wisdom-based animated video learning content. In this stage, three fundamental analyses were conducted: needs analysis, curricular analysis, and student characteristics analysis. The implementation of the define stage includes: (1) Needs analysis, through in-depth dialogue with mathematics teachers in class IX-B indicating that although educational institutions have provided various learning instruments, there remains a need for more interactive media to facilitate understanding of abstract mathematical concepts. The implementation of animated videos is viewed as effective due to their ability to visualize complex concepts and increase learning enthusiasm. The incorporation of Banten cultural elements is considered essential for creating relevant learning contexts and fostering appreciation for local cultural heritage. (2) Curriculum analysis, finding that SMP Negeri 10 Kota Serang implements the Merdeka Curriculum with a student-centered learning approach. Polyhedra material encompasses competencies in identifying

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geometric elements and applying surface area and volume formulas in practical contexts integrated with Banten cultural heritage. (3) Student characteristics analysis, through interviews with two students showing cognitive barriers in assimilating abstract mathematical concepts, particularly in visualizing dimensional aspects in polyhedra material. Conventional learning media are considered less attractive. Students show enthusiasm toward the use of animated videos integrated with Banten cultural elements as they are perceived as more interactive and contextual. The survey also showed that all 36 students have access to personal electronic devices, supporting the implementation of digital technology-based learning.

Design Stage

In this stage, all activities were aligned with the findings from the analysis stage to develop instructional media that truly corresponds to identified needs. The following is the series of processes in the design stage: (1) Equipment preparation stage, implemented by preparing the main application, Canva Pro, for creating visual elements and animations as well as Google Drive as a repository and distribution medium for learning content. (2) Data collection stage, researchers constructed learning substances that correlate with Learning Outcomes and Learning Objectives formulated within the Merdeka Curriculum framework, with specific emphasis on polyhedra material (including cube shapes, rectangular prisms, pyramid constructions, and prism structures). Content was developed based on Mathematics for SMP/MTs Grade IX references from Kemendikbud Ristek and equipped with exercises that accommodate mathematical concept understanding indicators. (3) Design creation stage, involving the development of animated video structure with 1920 x 1080 pixel resolution in landscape orientation. The video architecture consists of opening segments (title and identity), main menu (learning outcomes and indicators), introduction (animated characters and mathematics relationship with Banten culture), material substance (five video segments about polyhedra with integration of Banten historical landmarks such as Regent's Pendopo Building of Serang City, Banten Grand Mosque, Joeang 45 Building of Serang City, and Avalokitesvara Vihara), and closing. (4) Instrument development stage, researchers developed validation sheets for material experts (two middle school mathematics teachers) and media experts (two mathematics education lecturers), practicality instruments to measure student responses, and mathematical concept understanding evaluation instruments (pretest and posttest).

Develop Stage

The development stage represents the concretization of planning formulated in the previous design stage, continued with the implementation of subsequent steps to produce a final product in the form of Banten local wisdom-based animated video instructional media that has undergone improvement processes based on validator input and suggestions. The series of activities in this stage includes validation processes by experts and limited experimentation as follows:

1. *Product Development*

The development of Banten culture-based animated video learning media was carried out using Canva Pro by integrating various visual elements representing

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local cultural richness in a structure that includes opening, navigation menu, narrator characters, and material content about polyhedra correlated with iconic buildings such as Regent's Pendopo of Serang City, Banten Grand Mosque, Joeang 45 Building of Serang City, and Avalokitesvara Vihara. Visual displays were enriched with the use of attractive colors and distinctive Banten batik motifs, while content was arranged systematically from learning outcomes to final conclusions. All elements were designed considering the needs of ninth-grade students at SMP Negeri 10 Kota Serang as the main target audience. This learning media aims to facilitate the improvement of mathematical concept understanding through contextual approaches that integrate local wisdom as a bridge to understanding.

2. *Product Validation*

a. Validation Results

Evaluation instruments can be categorized as valid if they can accurately measure what should be measured (Sukendra & Atmaja, 2020). In this development stage, researchers have produced Banten local wisdom-based animated video learning media that has been revised based on recommendations submitted by validators. The validation process was conducted by 2 material expert validators and 2 media expert validators.

1) Material Expert Validation Data Results

The questionnaire instrument used consisted of 16 question items. The evaluation process was conducted on February 7, 2025, by two material experts, namely Ibu Emi Sri Wiharjanti, S.Pd. and Ibu Siti Muslihah, S.Pd., who are middle school mathematics educators. Both evaluated the feasibility of learning media based on aspects of material appropriateness, presentation, and usefulness. The results of material expert evaluation of learning media are represented in Table 4 below:

Table 4. Material validator assessment percentage

No	Aspect	Total Score	Percentage	Criteria
1.	Kesesuaian Materi	60	86%	Very Valid
2.	Penyajian	40	80%	Valid
3.	Kemanfaatan	37	93%	Very Valid
	Total	137	86%	Very Valid

Based on the compilation of these results, the learning content obtained evaluation from material experts with material appropriateness aspect reaching 86% percentage ("very valid" category), presentation aspect 80% ("valid"), and usefulness aspect 93% ("very valid"). Overall, the learning content received an average score of 86%, classifying it in the "very feasible" category. These results show that the material substance has met standards for content, presentation, and benefits in supporting mathematical concept understanding. High validity in these aspects provides a strong foundation that this media is suitable for use in the learning process.

These validation results align with research by Lailia (2021), which also showed that learning media with high validity in material, presentation, and usefulness aspects proved effective in improving student understanding. The similarity lies in the use of visual-based media to facilitate abstract concepts becoming more concrete. However, the advantage of this research compared to

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Lailia (2021) is the integration of local cultural contexts that strengthens material relevance with student experiences. On the other hand, the weakness of this research lies in the limitation of validation test samples that have not included diverse student backgrounds.

2) Media Expert Validation Data Results

Media expert evaluation functions to measure the feasibility of learning media using a questionnaire instrument consisting of 17 question items. The assessment process was conducted by two academics, namely Prof. Maman Fathurrohman, Ph.D. on January 31, 2025, and Mr. Ihsanudin, M.Si. on February 7, 2025, both of whom are lecturers in mathematics education programs. Both evaluators assessed the feasibility of learning media based on aspects of media display, design quality, presentation, and usefulness. The results of media expert evaluation of the developed learning media are presented in Table 5 below:

Table 5. Media validator assessment percentage

No	Aspect	Total Score	Percentage	Criteria
1.	Tampilan Media	41	82%	Very Valid
2.	Kualitas Desain	29	73%	Valid
3.	Penyajian	29	73%	Valid
4.	Kemanfaatan	29	73%	Valid
	Total	128	75%	Valid

Learning media validity is a crucial aspect to ensure that the developed product is truly suitable for use in student learning processes. Based on tabulation results, learning media obtained assessment from media experts of 75% with "feasible" category. Further assessment shows that visual display aspect obtained a score of 82% (very valid), design quality aspect of 73% (valid), presentation of 73% (valid), and usefulness of 73% (valid). Overall, the combined average percentage from two material validators and two media validators reached 80.5%, categorized as "very valid".

Visual aspects and local cultural values also play a major role in media acceptance in learning environments. Chandra et al. (2024) mentioned that attractive visual design appropriate to student characteristics can increase learning motivation, reflected in the high score on media display aspects. Additionally, validation from experts also assessed the success of this media in representing local culture appropriately. According to Handayani et al. (2020), content presentation considering local cultural values can strengthen connections between subject material and student life, making learning more relevant and contextual. Considering evaluation results and input from validators, this media development is declared to have met validity and feasibility criteria. Therefore, this Banten local wisdom-based animated video learning media is suitable for use as a means to improve students' mathematical conceptual understanding in schools.

b. Practicality Test Results

Practicality means being practical, indicating ease and comfort in using something (Butar-butar et al., 2020). Practicality testing was conducted to evaluate the extent to which Banten local wisdom-based animated video learning media can be implemented effectively and enjoyably by students in instructional processes.

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Evaluation was conducted based on three main aspects: interest, material, and language. The interest aspect measures the extent to which visual representation and media content stimulate student attention during the learning process. Meanwhile, material and language aspects evaluate content appropriateness with learning objectives and accessibility in understanding information communicated through media. Media practicality test evaluation results are presented in Table 6 below:

Table 6. Practicality test results percentage

No.	Aspect	Percentage	Criteria
1.	Ketertarikan	79%	Practical
2.	Materi	82%	Very Practical
3.	Bahasa	85%	Very Practical
	Total	82%	Very Practical

Practicality is an important aspect in learning media evaluation because it directly relates to ease and effectiveness of product implementation by users. This aligns with Achmad et al. (2021) who emphasized that practicality is a determinant of successful learning media use in classrooms. Based on evaluation results, student interest aspect obtained a score of 79%, showing that visual representation and video content are quite effective in attracting attention and learning interest of students. Material aspect reached 82%, indicating that content substance is considered relevant, appropriate, and capable of facilitating optimal mathematical concept understanding. Meanwhile, language aspect obtained the highest score of 85%, indicating that language use in animated videos is very easy for students to understand without causing linguistic confusion.

The comprehensive average of these three aspects is 82%, so this media falls into the very practical category for implementation in mathematics learning. This assessment supports findings from Adi et al. (2021) who stated that animated video media can optimize learning duration without disrupting planned time allocation in the curriculum. Additionally, attractive visual format and local culture-based content presentation proved capable of increasing student focus and reducing boredom during learning processes. The presence of cultural context in media also strengthens student understanding of material, as seen from their ability to complete learning evaluations more comprehensively. Therefore, this learning media is not only technically practical but also pedagogically relevant in facilitating effective and meaningful learning experiences.

c. Effectiveness Test Results

Effectiveness represents the extent to which objectives can be realized in terms of quantity, quality, and temporality (Ikhsan, 2022). The effectiveness level of Banten local wisdom-based animated video instructional media was evaluated through conducting initial evaluation (pretest) and final evaluation (posttest) on students. The purpose of this evaluation is to measure the progressivity of students' mathematical conceptual understanding after using the developed media. Comparative analysis between initial and final evaluation results was utilized to measure the extent to which the media can facilitate students in understanding

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polyhedra material. Analysis results in Table 7 become crucial indicators in evaluating media success in significantly improving learning outcomes.

Table 7. Effectiveness test assessment results percentage

No.	Aspect	Percentage	Criteria
1.	N-Gain Score	0,77	Tinggi
2.	N-Gain Effectiveness Interpretation	76,74%	Efektif

Based on data analysis results, an N-Gain Score of 0.77 was obtained, categorized as "high", and N-Gain effectiveness percentage of 76.74%, classified as "effective". These findings show that Banten culture-based animated video learning media can provide significant influence on improving students' mathematical concept understanding. This improvement aligns with research results by Putri and Agustika (2022) who revealed that using animated video media with local cultural contexts significantly strengthens mathematical concept understanding, as reflected in field test scores of 92.76%. In their study, local cultural integration proved to create meaningful connections between students and learning material, indirectly increasing student engagement and understanding. Through local wisdom-based approaches, students are not only helped in understanding polyhedra material but also gain deeper understanding of relevant cultural values. Thus, this media's success in improving learning outcomes is not solely driven by visual and design aspects but also by cultural context integration that enriches students' cognitive processes in absorbing and connecting material with daily life. Therefore, the developed learning media can be said to be effective in supporting comprehensive achievement of mathematics learning objectives.

3. *Product Revision*

During the media evaluation process, experts provided comments and recommendations to researchers as considerations for improving or modifying learning media to be more accessible to students. Results from this learning media improvement process are outlined in Table 8 below:

Table 8. Product revision

Revision 1 (Media Expert)	
Before Revision	**After Revision**
	
The use of batik background design in the product was inappropriate because it did not display authentic Banten batik motifs.	The use of batik background design in the product is now appropriate, displaying suitable and authentic Banten batik motifs.
Revision 2 (Material Expert)	

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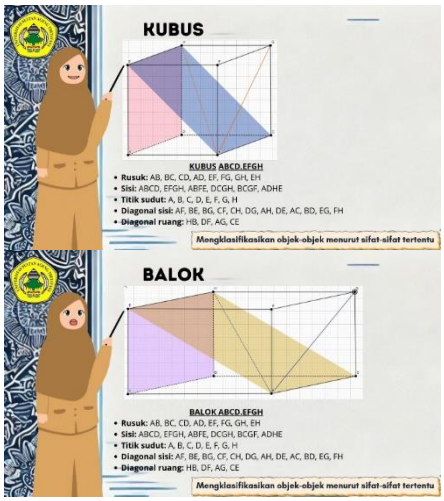
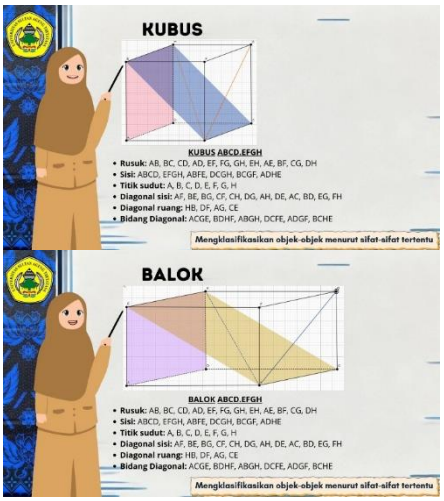
Before Revision	After Revision
	
Material listed in cube and rectangular prism videos was incomplete: 1. Number of edges, where only 8 edges were listed when there should be 12 edges. 2. "Diagonal Bidang" were not included.	Material listed in cube and rectangular prism videos has been completed: 1. Number of edges, now lists 12 edges. 2. "Diagonal Bidang" are now included.

Disseminate Stage

The dissemination process in this investigation has the objective of ensuring that Banten local wisdom-based animated video learning instruments can be implemented extensively and provide significant contributions to learning communities and educators. In the disseminate stage, researchers conducted limited dissemination due to various limitations faced. The final product in the form of animated video-based learning media integrating Banten local wisdom values to improve mathematical conceptual understanding was distributed exclusively through scientific publication and the researcher's YouTube digital platform with channel identity "Aulia Urohmah". Additionally, links to learning content were also distributed through various other social media platforms.

Discussion

This research produced findings that Banten local culture-based animated video learning media is effective in improving students' mathematical concept understanding in polyhedra material. This is shown from material and media validation results reaching very valid categories, high practicality scores from interest, material, and language aspects, and effectiveness categorized as high based on N-Gain value of 0.77. These three indicators show that the developed media is not only feasible and practical to use but also has positive impacts on student learning outcomes. This media can bridge the gap between abstract concepts in mathematics and real contexts close to student life through visualization and local cultural integration.

Factors causing this success include the use of Banten local culture-based ethnomathematics approaches that make mathematical material more contextual

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and meaningful. Additionally, the use of attractive visual design and easily understood language increases student interest and understanding of learning content. The involvement of material and media expert validators in the development process also contributed greatly to final product quality, as their input was used to revise and improve the media. The development approach through the 4D model (Define, Design, Develop, Disseminate) also supported media success in achieving high validity, practicality, and effectiveness.

The advantages of this research lie in the integration of local culture into learning media that has not been widely developed specifically in mathematical contexts, and the use of interactive digital media suitable for current generation learner characteristics. Additionally, comprehensive evaluation methods through expert validation, practicality testing, and effectiveness testing provide strong and holistic data. However, this research has limitations in the number of trial subjects limited to one school and one grade level, so result generalization needs to be done carefully. Furthermore, the developed media only covers one learning topic, so it does not represent broader material coverage in mathematics curriculum.

The results of this research align with research conducted by Jusmiana et al. (2020), which stated that animated video media can improve mathematical concept understanding through more attractive and easily understood material presentation. These findings also support results from Komara et al. (2022) who emphasized the importance of learning media compatibility with instructional objectives and curriculum to achieve maximum effectiveness in teaching and learning processes. Additionally, this research strengthens studies by Fatimah et al. (2024), which showed that local cultural integration in learning media can enrich learning contexts, so students can understand mathematical material through approaches that are more meaningful and relevant to their daily lives. Thus, there are no significant contradictions between the results of this research and previous research, but rather expand the scope of theory and practice in the field of digital media-based ethnomathematics that prioritizes visual, cultural, and contextual aspects in 21st-century learning.

The theoretical implications of this research show that mathematics learning approaches combining digital technology with local cultural values can be effective strategies in supporting student conceptual understanding (Wirawan & Novaliyosi, 2023). These findings strengthen constructivism theory that emphasizes the importance of connections between learning experiences and students' real-life contexts, including cultural aspects they recognize (Suparlan, 2019). From a practical side, this media can be used as an attractive and relevant teaching alternative for teachers in various regions with their respective local cultural characteristics, making learning more contextual and grounded. This research also contributes to the development of local context-based learning media that has been minimally developed in mathematics, especially in terms of visual design, narrative content, and connections between mathematical symbols and cultural artifacts. Therefore, the results of this research can become important references in curriculum innovation and future learning media development, and encourage cultural preservation efforts through integration of local values into formal education systems.

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Conclusion and Suggestion

This study aimed to develop an animated video learning medium based on Banten culture and examine the feasibility, practicality, and effectiveness of the medium in enhancing students' understanding of mathematical concepts. The research findings indicate that the developed medium is categorized as highly valid, highly practical, and effective based on expert validation results, practicality tests, and effectiveness tests through N-Gain analysis. This medium is declared to meet the feasibility requirements for use in mathematics learning processes, particularly for flat-sided solid geometry material. These findings demonstrate that integrating local wisdom into digital media can serve as a relevant, engaging, and meaningful learning alternative for students.

It is recommended that teachers optimally utilize culture-based animated video media as a contextual and engaging alternative for mathematics learning. The use of this medium can help bridge abstract concepts with students' daily lives through familiar cultural approaches. Future researchers are advised to enhance the interactive aspects of the medium and expand the scope of learning materials. Additionally, trials on broader and more diverse populations need to be conducted to make research results more generalizable and applicable.

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